Rupture of spinal cord ependymoma

Case report

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The rupture of an ependymoma of the cauda equina associated with trauma and subarachnoid hemorrhage is described. The clinical course of the patient is discussed, and the mechanism and significance of the rupture postulated.

Key Words - spinal cord tumor - ependymoma - cauda equina

In the present report a case of an ependymoma of the cauda equina is described in which there was actual rupture of the tumor capsule and scattering of the tumor contents among the nerve roots throughout the lumbar subarachnoid space. Preoperative rupture of these neoplasms has not been described before.

Case Report

An 11½-year-old girl who was entirely well, slipped and fell on wet grass striking her buttocks and low back. She got up immediately and rode her bicycle home, noting some low back pain. Within 1½ hours the pain had become very severe, radiating into both hips and lateral thighs. She vomited later that night and began to complain of headache and pain on bending her neck. The following day she remained at home in bed. She was awake and alert, her temperature 101°F. She was noted by a physician to have opisthotonic posturing and complained of persistent severe headache and back pain. She did not improve over the following night and on June 11, 1969, was admitted to Strong Memorial Hospital.

Examination. The blood pressure was 110/50, pulse 80/min, and respirations 12/min and regular. Her general physical examination was normal except for opisthotonic posturing and severe discomfort. Straight leg raising tests were positive bilaterally. There was tenderness over the twelfth thoracic and first lumbar spinous processes. Both knee and ankle jerks were increased, and there was an intermittent Babinski sign on the left side. Two lumbar punctures revealed grossly bloody, xanthochromic spinal fluid under pressure as high as 560 mm H2O; total protein determinations were 160 and 100 mg%, while the glucose was normal. A myelogram demonstrated an intradural mass at L2-3 (Fig. 1).

Operation. A bilateral laminectomy of L1-2-3 was carried out. There was no lesion or blood in the epidural or subdural space. At the caudal end of the dural opening, deeply xanthochromic fluid was seen in the subarachnoid space, the arachnoid was opened and the fluid removed with some.
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clotted blood. The nerve roots of the cauda were distorted, compressed, and rotated from right to left by an underlying firm mass which proved to be made up of solid blood clot and purple tumor. Additional pieces of tumor and solid clot lay free in the subarachnoid space on the right side; when these pieces had been removed a large solid tumor was seen within the filum terminale. The tumor had ruptured on its right side, spewing clot and pieces of tumor into the subarachnoid space. The filum was isolated proximally and distally. It was followed rostrally to the conus. The fifth sacral root was identified, and just below this level the filum was divided, lifted out, and sectioned distally between silver clips at the L-4 level. There was a long segment of filum that appeared normal. Histological examination revealed the tumor to be a papillary ependymoma. It was located within a syrinx in the distal conus and extended caudally into the filum terminale (Fig. 2).

Postoperative Course. Following surgery the patient had no pain or opisthotonus, was able to void normally, and had no neurological deficit. She was discharged on the eighth postoperative day and subsequently received a course of radiation therapy consisting of 4000 rads in 4½ weeks to the lower spinal cord and nerve roots. At the present time, over 3 years after her operation, she remains neurologically normal. The movements of her spine are full and there is no back tenderness.

Discussion

The unique feature of this case was the rupture of the tumor capsule and the displacement of pieces of tumor tissue through the capsular defect without obvious diffuse implantation within the subarachnoid space. The tumor contained a number of blood clots (0.5 to 1.5 cm³). There was

Fig. 1. Pantopaque myelogram demonstrating intradural mass at L2-3.

Fig. 2. Photomicrograph of ependymoma with numerous thin-walled capillaries. There is a pseudorosette at the lower left. H & E, X 116.
bloody xanthochromic spinal fluid, and a diagnosis of subarachnoid hemorrhage could be made with assurance. Subarachnoid bleeding due to intraspinal neoplasms, although uncommon, has been described previously.\textsuperscript{4,5,7-9} A history of trauma precedes the onset of symptoms in about one third of the patients with spinal cord ependymomas,\textsuperscript{1,3} and its even more closely correlated with cases presenting with subarachnoid hemorrhage.\textsuperscript{6} Bailey\textsuperscript{2} described a case in which trauma not only preceded the symptoms but definitely initiated them and may have caused occult rupture and dissemination of an ependymoma of the conus. His patient was a 9-year-old girl whose symptoms of occipital headache and back and leg pain began suddenly after she was thrown roughly over her father's shoulder.

Thoracolumbar laminectomy 4 years later showed diffuse tumor adherent to the dura and nerve roots without a capsule. The growth was discretely attached to the conus, and it was postulated that the mass had ruptured at the time of her father's tossing her about and subsequently seeded the lumbar subarachnoid space. Smith\textsuperscript{TM} has shown in the monkey that in acute flexion of the spine and hips the spinal cord will move cephalad and the cauda equina caudad. The conus region is at the balance point of opposing forces. It is reasonable to postulate that longitudinal stress could rupture a thinly encapsulated tumor growth within the filum. In our case this mechanism may have been activated when the child slipped and fell on her buttocks.

Myelography accurately delineated the lesion but failed to demonstrate the free pieces of tumor in the subarachnoid space. This makes it necessary to consider the possibility that perhaps the rupture occurred following myelography, or intraoperatively. The positioning of the patient on the operating table and the operative technique itself were carried out so carefully that it seems doubtful that either could have ruptured the capsule. The history and clinical course support premyelographic rupture.

Ependymomas, particularly those of intracranial origin, are known to seed the subarachnoid space in nearly one third of the cases in some series. Many recur locally in spite of total gross excision. These factors, in addition to knowing that tumor cells had certainly been left in the subarachnoid space at the time of surgery, prompted the decision to irradiate the lower spinal axis in this patient. This course of therapy is supported by Barone and Elvidge\textsuperscript{3} in their review of spinal cord ependymomas. They indicate that their patients with incomplete tumor removal survived longer if they received irradiation therapy. A less optimistic view is held by Kricheff, \textit{et al.},\textsuperscript{6} who noted in their patients that there was a marked variability in the responsiveness of residual cells to irradiation therapy, which was irrespective of the histological grade of the neoplasm. Ayers\textsuperscript{1} believes that x-ray therapy may be palliative but not curative.

At the present time the patient is doing well, but her long-term prognosis seems less certain.

References
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